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EQUIPPING FOREIGN AIR FORCES: HOW FAR SHOULD THE US GOVERNMENT GO?

by

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Preface

In addressing the question of why we should sell high-tech US weapons to foreign air forces, one needs to be aware of the “big picture” global situation. Factors that go into this decision need to be made aware to anyone finding himself involved with foreign air forces, either from a staff position or operationally.

As I return to my primary duty in the Air Force, F-15C pilot, my perspective on coalition warfare will not be quite the same as it was before I did this study. The amount of US aircraft and weapons sold to foreign air forces, as well as systems sold by other countries to our allies, is significant. We all need to know what is out there as we prepare for war, not just on the enemy side but in our coalition forces as well.

Abstract

Selecting the right aircraft and associated armament to sell to a foreign air force can be a complex and risky decision. There is potentially much to be gained by making the good sell, but even more to lose due to a bad decision to sell. Many factors go into the decision, and there are often more countries available to sell similar systems if the US government disapproves the sale.

Using the three core values presented in US National Security Strategy, along with some case studies from past sales, this paper develops a set of guidelines. These guidelines can be used to assist in making this somewhat complex decision with consistency and logic. Using this information, the paper finishes with a discussion and general recommendations on what should be done when confronted with future cases of weapons releases involving the F-16, JSF, F-22, AMRAAM, and AIM-9X.

All data presented was obtained from public access documents such as magazines, books, and US government web sites. The analysis of cases studied is done with the objective of supporting US National Security.

Chapter 1

Introduction

There's just no place you can go any longer and escape the global problems, so one's thinking must become global.

—Theodore Roszak

This paper is written to assist those interested in Foreign Military Sales (FMS) and Direct Commercial Sales (DCS) of US weapons systems to foreign air forces. The information presented will set the foundation necessary for making informed decisions in an area where the financial and security consequences could have a significant impact on the United States as well as the rest of the world.

In the chapters that follow, several notable cases involving the transfer of US aircraft and weapons to foreign air forces will be examined. These case studies will present examples of arms transfers that were beneficial to the US. They will also provide some noteworthy instances of where we may have crossed the line of good judgement, failing to support US policies and security requirements. Drawing upon our prior experience in arms transfers, some rules to help guide the decision making process are given. Although by no means a complete list of rules, they are designed to keep the process focused on supporting the security interests of the US. Finally, using these rules, some current and future cases involving the transfers of US aircraft and weapons are studied.

All data presented was obtained from public access documents such as magazines, books, and US government web sites. The analysis of cases studied is done with the objective of supporting US National Security. Following these case studies, a short review of air-to-air missiles and the support requirements necessary for modern air weapons will be presented.

How Far *Should* we Go?

How far should the US government go in allowing the sale of weapons systems to foreign air forces, and at what point will it begin to impede rather than enhance US national security? In answering this question, US National Security Strategy provides some guidance. The three core objectives of US National Security Strategy are to *enhance our security*, to *bolster America's economic prosperity*, and finally to *promote democracy abroad*.¹

To Enhance Our Security. *Enhancing the security* of the United States is the number one core objective of our National Security Strategy.² In making the decision of whether or not to sell arms to foreign nations, we must carefully analyze the risks versus the benefits. There may be risks due to the compromise of sensitive technology, technology that our military forces and those of our closest allies depend on for national defense. There may be risks in selling weapons to nations that may turn on us. In this situation, the US military or our allies could face our own aircraft in armed conflict. According to US National Security Strategy, “effective arms control is really defense by other means.”³

There is much to be gained from selling US aircraft and weapons to foreign air forces. Interoperability is enhanced, should we call upon them to assist us as coalition

forces. We strengthen the ties between the US and foreign governments by trusting them with our high-tech systems. And finally, the US economy will prosper from the billions of dollars we gain in exports.

To Bolster America's Economic Prosperity. The second core objective of our National Security Strategy is to *bolster America's economic prosperity*.⁴ According to US National Security Strategy, "our economic and security interests are inextricably linked."⁵ In 1996, US arms exports totaled \$23.5 billion, almost four times greater than the second greatest exporter of arms (the United Kingdom, at \$6.1 billion).⁶ Clearly, exporting arms can go a long way toward bolstering our economy and lessening the US trade deficit.

To Promote Democracy Abroad. The third core objective is to *promote democracy abroad*.⁷ Our international allies, the nations we chose to sell arms to, must be committed to promoting democracy and human rights. Allowing weapons, conventional or otherwise, to fall into the hands of irrational dictators or power-hungry madmen with a history of human rights violations will impede the success of emerging democracies and destroy the credibility of the US government. Strengthening democratic reforms abroad helps to encourage international stability and enhance US security.

The core objectives of our National Security Strategy are excellent guiding principles to assist in the complex and confusing world of international arms sales. All three principles are important, and care must be used to ensure one principle is not focused on at the detriment of the others. For example, concentrating on bolstering the economy without giving attention to enhancing security or promoting democracy could lead to

serious consequences for US interests. Enhancing the security of the US is the primary core objective.

In the pages that follow, several notable cases involving the sale of US aircraft and weapons to foreign air forces will be examined. These cases will highlight both negative as well as positive aspects of international arms sales. Based on these cases, five basic rules are formed. These rules are designed to minimize the chances of repeating mistakes and maximize the chances of attaining the core objectives of our National Security Strategy. Finally, possible future cases will be studied. The rules formed in the previous section will be applied to these future cases, and the result will be logical and consistent courses of action in our policies of equipping foreign air forces.

Notes

¹ *A National Security Strategy for a New Century* (The White House, October 1998), iii.

² Ibid.

³ Ibid., 9.

⁴ Ibid., iii.

⁵ Ibid., 27.

⁶ US Arms Control and Disarmament Agency. *Country Rankings: 1996, 1997*, n.p.; on-line, Internet, 5 February 1999, available from <http://www.acda.gov/wmeat95/wmeatlst.htm>.

⁷ *A National Security Strategy for a New Century*, iii.

Chapter 2

A Review of Arms Transfers

Whoever doesn't know the past must have little understanding of the present and no vision of the future.

—Joseph S. Raymond

Throughout the evolution of airpower, aircraft and their associated weapons have been sold between various nations. Many aircraft are designed with the intention of being exported. The US F-16, for example, has been marketed and sold around the world. To date, several models of the F-16 have been sold to 17 countries outside of the US.¹ These countries are listed below:

| | | |
|-----------|-----------------|-----------|
| Bahrain | Israel | Singapore |
| Belgium | Jordan | Taiwan |
| Denmark | Korea | Thailand |
| Egypt | The Netherlands | Turkey |
| Greece | Norway | Venezuela |
| Indonesia | Portugal | |

The F-16 is very capable in both the air-to-air and air-to-ground roles. This makes it very attractive to air forces only able to afford a single type of fighter aircraft.

In the following paragraphs, historical case studies of the sale of US weapons to foreign air forces will be discussed. These case studies will highlight certain aspects of arms transfer, providing good reasons for making the sale as well as reasons why we may need to exercise more restraint. These examples will provide the basis that leads into the

investigation of the impact US weapons sales to foreign air forces may have on the security of the US.

Beneficial to the US

Each of the following five cases illustrates how exporting US weapons to foreign air forces can support US National Security Strategy.

The United Kingdom

The United Kingdom (UK) has been a highly trusted ally of the US. We have always maintained liberal weapons trade policies with the UK, to the benefit of both nations. As WWI began, the US found itself at a disadvantage in airpower, a need that the UK was more than willing to fill. Army Air Corps pilots flew British-made aircraft, including the Sopwith Camel.² The Camel was the favorite of many US pilots, including American ace First Lieutenant George Vaughn Jr. who completed the war with 13 kills.³ In May 1941, Royal Air Force pilots were the first to take the new B-17 Flying Fortress into action.⁴ The B-17 was the newest and most capable US bomber, and the Royal Air Force was allowed to fly them at the expense of filling US Army Air Force requirements. Today, the UK is a major customer of US weapons, including the sophisticated AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM). The cooperation between the US and the UK goes beyond arms trading, though.

The UK and the US have fought side-by-side in many conflicts, the most recent being operation Desert Fox. They have demonstrated their resolve to support their interests in world affairs, which are usually consistent with those of the US. Clearly the

UK supports all three core objectives of US National Security Strategy, and it is in the best interest of the US to continue to maintain a liberal arms trade with the UK.

European Air Forces

The countries of Belgium, Denmark, The Netherlands, and Norway, collectively known as the European Air Forces (EPAF), represent the largest buyer of F-16s outside of the US. Their original 1975 purchase order was for 348 F-16s, but it has since grown to nearly 500 aircraft. This sale was a major success for General Dynamics, immediately following the announcement of the US Air Force to purchase F-16s to replace its Vietnam-era fighter fleet.⁵ The US-designed and built F-16 was well on its way to becoming a worldwide success.

The EPAF nations, all members of NATO, are highly trusted allies of the US. In selling the F-16 to these nations, we have strengthened our ties in Europe. If ever faced with conflict, supporting the combined US and NATO forces, both flying the F-16, would be greatly simplified due to the resulting interoperability between the US and EPAF nations. Like the UK, selling the F-16 to the EPAF nations supports all three core objectives of US National Security Strategy, making it a good move for both nations.

South Korea

With the ever-present threat from North Korea, the Republic of Korean Air Force (ROKAF) is faced with the continuous prospect of renewed hostilities. As the US military downsizes, the US Air Force presence in South Korea may not remain as strong as it is now. South Korea is faced with the prospect that the ROKAF may need to be more self-reliant.

In addition to supporting our efforts to promote democracy abroad, South Korea is becoming more economically interdependent with the rest of the world. Exports from South Korea have exploded from \$5.1 billion in 1975 to \$76.6 billion in 1992, and imports have gone from \$7.2 billion in 1975 to \$81.8 billion in 1992. Economic ties with the US have strengthened. In 1992 South Korea exported \$18.1 billion to the US, up from \$1.5 billion in 1975, and imported \$18.3 billion from the US, up from \$1.9 billion in 1975. Economic ties with other nations have followed similar trends.⁶ South Korea has become a modern industrial power.

In its continuing efforts to strengthen the ROKAF, South Korea was granted a license to coproduce the F-16. Under this license, as many as 160 F-16s may be manufactured.⁷ It is clearly in the best interests of US security to sell and allow the coproduction of F-16s in Korea. Supporting the ROKAF is beneficial to attaining all three objectives of US National Security Strategy.

Israel

Stability in the Middle East is important in maintaining the free flow of oil to the US, and Israel is a key nation in maintaining the stability. Israel has been in constant conflict with Russian supplied nations like Syria and Iraq. The US government, in the traditional East versus West view of world relations, has chosen to side with Israel. The American-Israeli lobby, which is based on ties between prominent Jewish-Americans and Israel, has also been very influential in maintaining our close ties with the government of Israel. The Israeli influence has made them a recipient of US economic assistance. Israel receives US loans to be used towards Foreign Military Sales (FMS) of US weapons systems, nearly half of which is converted into grants. In 1983 alone, the US gave Israel

\$1.7 billion in military aid.⁸ The net result of this arms trade with Israel is that the US government has given Israel billions of dollars in high-technology weapons. The US government has taken a special interest in Israel, and our liberal (and expensive) arms trade policies with them are a direct result of this.⁹

As long as the US has an interest in the Middle East, we will most likely maintain our support of Israel. But what do we get from Israel in return for our “contributions”? Israel is strategically located, and we rely on them to provide access to their facilities. Even more important to us is the deterring influence gained in the region. A well-armed Israel has given them the capability to defend their interests, and the threat of US involvement will make any hostile nation think twice before engaging Israel in armed conflict. As long as the government of Israel remains friendly towards the US and supports US policy, we will continue to provide military support to them.

United Arab Emirates

The threat from Iraq remains in the Persian Gulf, and it is to our advantage to strengthen existing ties with our allies in the region. The United Arab Emirates (UAE), an American ally in the Gulf War, is one such country. Giving them the capability to strike back against Iraq would build up the coalition combat power, ultimately contributing to US national security. In 1994 the UAE, as part of their efforts to upgrade their defense, began to review the new fighters available to them. Among the primary contenders were the French Mirage 2000-5 and Rafale, the Russian Su-30MK and MiG-29M, and the US Lockheed Fort Worth F-16 and McDonnell Douglas F-15.¹⁰ After several years of review, the UAE announced their selection of the F-16 Block 60.

This is no ordinary F-16 the UAE plans to buy. The F-16 Block 60 will be the most advanced and capable F-16 ever built (it is so advanced it hasn't even been flown yet), and quite probably the second most capable aircraft in the world (second only to the F-22, which is still several years from being operational). And the list of weapons to go with the F-16 Block 60 package is just as impressive. The purchase will include 491 AIM-120B AMRAAMs and 267 AIM-9M-1/2 Sidewinders to give it a powerful air-to-air capability. Also included will be 163 AGM-88 High-Speed Anti-Radiation Missiles (HARM), 1163 AGM-65D/G Maverick missiles, 52 AGM-84 Harpoon missiles, 605 GBU-10 and 462 GBU-12 Paveway II Laser-Guided Bomb (LGB) kits and 606 GBU-24 Paveway III LGB kits. This impressive array of weapons, when employed on the F-16 Block 60, will give the UAE significant military capability.

As impressive as the Block 60 may be, the UAE military might will come from the weapons employed, not the F-16 Block 60 itself. This is an important point to remember in military aircraft sales. An aircraft alone has no real offensive or defensive capability, it takes weapons to give the aircraft its strength. An F-16 Block 60 with outdated missiles and bombs is clearly no match for the same aircraft employing AMRAAMs, AIM-9M Sidewinders, and precision-guided bombs. The weapons make the buy, and the UAE has chosen some of the best weapons available in the world. This is a good purchase for the UAE, and hopefully this will also be successful in enhancing US national security.

Harmful to the US

The next two cases show how exporting US weapons to nations under the wrong circumstances can jeopardize US policies and interests.

Iran

Buildup. President Nixon's 1972 visit to Iran initiated what was to become one of the largest high-technology weapons sales of the decade. During the Nixon administration, US arms exports to Iran increased by 155 percent. In 1976 alone, Iran imported nearly \$2 billion in US-built weapons, making them the world's leading importer of arms¹¹. Included in this arms spree were some of the premier fighters employed by the US military. A total of 170 F-4E Phantom Fighters, 167 F-5 Tiger-2 fighters (complementing the 112 F-5s already owned by Iran), and 80 F-14 Tomcats were sold and delivered from 1970-1978. Additionally, 6 P-3 Orion anti-submarine aircraft, 12 RF-4E Phantom reconnaissance aircraft, and 43 C-130H transport aircraft were sold. To top off the fighting capability of these aircraft, they were armed with some of the leading US weapons technology.

A formidable air-to-air missile capability was provided to Iran during this period. A total of 424 AIM-54A Phoenix missiles to arm the F-14s, 2320 AIM-9J Sidewinders to arm the F-4E and F-14s, and 680 AIM-7C Sparrow to arm the F-4Es were sold. The F-4Es were given additional capability with 2850 AGM-65A air-to-surface missiles and the P-3s were armed with 72 AGM-84A Harpoon anti-submarine missiles.¹² Fortunately for the US, a 1976 deal for the sale of up to 300 F-16s¹³ and a 1977 agreement to sell 7 highly sophisticated AWACS aircraft¹⁴ were both terminated before the sale. This was due to the Carter administration's arms embargo against Iran resulting from the 1979 fall of the Shah. Unfortunately, sophisticated US-built weapons systems representing the foremost in US technology were now in the hands of enemies.

Betrayal. The US weapons transfer policy to Iran is a good example of how a liberal, short-term policy on arms transfer can lead to a potentially disastrous outcome.

Iran spent vast amounts of its national resources on US weapons, at the expense of the lifestyle of the Iranian population. The failure of the Iranian government to spend its money on social programs rather than defense hardware led to an increasing number of poor people. This fed the anti-American sentiment, and the Shah was well known for his relations with the US leaders. This anti-American sentiment eventually led to the overthrow of the Shah's government. The Iranian government became openly anti-American.¹⁵

The Threat. The danger of an anti-American government possessing large quantities of US weapons is two-fold. First, there is the obvious threat of the US and our allies having to face our own aircraft and weapons in armed conflict. Second, and potentially more damaging to the US, was the potential compromise of weapons technology that the US and our allies relied on for national defense. These weapons could be sold to US enemies, who could then reverse engineer and test the various components of each system. The information gained in the process would identify strengths and weaknesses of our systems. Missiles from the large stockpiles could be test fired in a variety of scenarios, again determining the strengths and weaknesses of our systems. Knowledge of these strengths and weaknesses could be used to develop tactics to defeat our weapons. The final result of our extensive weapons transfer programs to the Government of Iran was a serious risk to US national security.

Pakistan

The purchase of F-16s by Pakistan was halted in 1990 by the US, after payment of \$463.7 million by the government of Pakistan. These aircraft were not delivered by the US due to the imposition of sanctions against Pakistan under the Pressler Amendment

(which required sanctions if Pakistan were suspected of possessing a nuclear explosive device).¹⁶ These F-16s were flown directly from the factory to the boneyard at Davis-Monthan Air Force Base for storage. Although they are new for all practical purposes, they are also obsolete, which is impeding US attempts to sell them to another nation. President Clinton announced in December 1998 that the US would repay Pakistan \$324.6 million and additional benefits of up to \$140 million.¹⁷

The decision to sell F-16s to Pakistan did not support the first core objective of enhancing our security. National Security Strategy calls for nonproliferation initiatives, which enhance global security by preventing the spread of weapons of mass destruction.¹⁸ Thus, halting the delivery of these F-16s to Pakistan was a good decision, indicating US resolve in preventing the spread of weapons of mass destruction despite the fact that it cost US taxpayers nearly a half billion dollars.

Air-to-Air Missiles

The sophistication of the air-to-air missiles available from various nations today is extraordinary. The two main categories of air-to-air missiles, radar-guided and heat-seeking, are discussed below.

AMRAAM

The AIM-120B AMRAAM is the most sophisticated and capable air-to-air missile in the world. The launch range of the AMRAAM is well beyond the range a pilot can visually acquire the target aircraft, giving it beyond visual range (BVR) capability. The AMRAAM is a radar-guided missile. It uses information from the launch aircraft radar to begin guiding itself to the target until it's own active radar guidance is activated and

takes over, giving the pilot the option to leave the fight or target other aircraft. Its small size and high speed make the AMRAAM difficult to defeat by anyone unfortunate to be targeted by one.

Several competitors to the AMRAAM are emerging on the world market. A leading contender is the French Matra BAe MICA.¹⁹ Also on the market are the Russian R-37 and R-77 “AMRAAMski” which have active radar guidance.²⁰ In spite of this high-tech competition, the AIM-120B AMRAAM remains the most capable BVR missile in the world.

AIM-9

The AIM-9M Sidewinder is a significant improvement over its ancestors first used in the Vietnam War. Heat-seeking missiles with improvements over the AIM-9M are being offered by other countries, though. Germany’s Iris-T (Infra Red Imaging Sidewinder-Tail controlled) boasts a high off-boresight capability of up to 90° (the seeker head can track a target 90° off its nose) which gives a pilot the decisive first-launch opportunity over his opponent. It also includes a thrust vectoring control system, which makes the Iris-T very maneuverable in close-range dogfights. Deliveries of the Iris-T are expected in 2002.²¹ Rafael’s Python 4, made in Israel, is said to have off-boresight capability of up to 60° but does not feature thrust-vectoring capabilities.²² According to Military Technology, the Python 4 is thought to have been in use since the early ‘90s and is being actively marketed.²³ Finally, the French Matra Bae ASRAAM (Advanced Short-Range Air-to-Air Missile) is available and operational since 1998, giving it an edge in the market over missiles still being developed.²⁴ As good as the AIM-9M is, it does not offer the features which make it competitive to nations wishing to have the advanced

capabilities offered on other missiles in its class. This is where the next generation AIM-9 Sidewinder, the AIM-9X, takes over.

The AIM-9X Advanced Sidewinder is the US competitor to ASRAAM and Iris-T. The AIM-9X request for proposals included improvements in fuse, warhead, and IR seeker. Other requirements include off-boresight capability, improved maneuverability, and infra-red countermeasures resistance. Although not expected to be operational until 2003, the AIM-9X is expected to give US pilots the decisive first shot opportunity in aerial combat.²⁵

A Note on Support

The sophisticated aircraft and weapons now on the market require periodic inspection, repair, and upgrades. Missiles in storage have a limited shelf life and missiles carried on aircraft, but not actually fired, are subject to additional stresses and damage which can lead to greater probabilities of failure. Aircraft, the engines, radar, and all other sophisticated systems require periodic maintenance more complex than basic inspection and repair. Detecting and repairing missile or aircraft damage, and then testing them, requires training and equipment which some customers may not be capable of doing or authorized to perform (the specifics would be in the contract or memorandum of understanding). New parts are needed, which may be too complex for the customer to reconstruct. This builds a dependency between the buying nation and the selling nation. Breaking these ties could lead to a fleet of aircraft not capable of flying or effectively performing their mission.

Summary

In order to properly develop our vision of future arms exports, we must have an understanding of the past. From the cases presented in this chapter and the background information on missiles and maintenance we can learn from the bad as well as the good. It is these cases that we will use to formulate the rules used to guide arms transfer cases, which are outlined in the next chapter.

Notes

¹ Lockheed-Martin. *The Fighting Falcon F-16 – The Choice of Twenty Air Forces*, 1999, n.p.; on-line, Internet, 28 January 1999, available from <http://www.lmtas.com/f16/f16choic.html>.

² Lt. Col. Nick P. Apple and Lt. Col. Gene Gurney, *The Air Force Museum* (New York: Crown Publishers, Inc., 1980), 64.

³ *The Encyclopedia of Air Warfare* (New York: Thomas Y. Crowell Company, 1975), 42.

⁴ *The Rand McNally Encyclopedia of Military Aircraft, 1914-1980* (The Military Press, 1983), 288.

⁵ Ingemar Dorfer, *Arms Deal: The Selling of the F-16* (New York: Praeger Publishers, 1983), 98.

⁶ Byung-Nak Song, *The Rise of the Korean Economy* (Hong Kong: Oxford University Press, 1994), 208-212.

⁷ Paul Proctor, "Basic Defense Work Still on Track in Asia," *Aviation Week and Space Technology*, vol. 148, no. 8 (23 February, 1998), 66.

⁸ Andrei Kozyrev, *The Arms Trade: A New Level of Danger* (Moscow, USSR: Progress Publishers, 1985), 163.

⁹ Paul Ferrari, Jeffrey Knopf, and Raul Madrid, *US Arms Exports: Policies and Contractors* (Washington DC: Investor Responsibility Research Center, 1987), 98-100.

¹⁰ David C. Isby, "The Emirs' New Swords," *Military Technology*, vol. 19, no. 3 (March 1995), 10.

¹¹ Ferrari, Knopf, and Madrid, *US Arms Exports: Policies and Contractors*, 102.

¹² Michael Brzoska and Thomas Ohlson, *Arms Transfers to the Third World 1971-1985* (New York: Oxford University Press, 1987), 189-190.

¹³ Dorfer, *Arms Deal: The Selling of the F-16*, 86.

¹⁴ Ferrari, Knopf, and Madrid, *US Arms Exports: Policies and Contractors*, 102.

¹⁵ Ibid.

¹⁶ US Department of State. *Country Commercial Guides: Pakistan*, 1999, n.p.; on-line, Internet, 5 February 1999, available from http://www.state.gov/www/about_state/business/com_guides/1999/sa/pakistan99.html.

Notes

¹⁷ US Information Agency. *US, Pakistan Reach Agreement on F-16 Aircraft*, 1999, n.p.; on-line, Internet, 5 February 1999, available from <http://www.usia.gov/regional/nea/sasia/docs/doc96.html>.

¹⁸ *A National Security Strategy for a New Century* (The White House, October 1998), 6-12.

¹⁹ Jean Dupont, "Europe Competing Strongly in AAMs," *Interavia*, vol. 53, no. 616 (January 1998), 42.

²⁰ Nick Cook, "Russian Missiles Hot up Western Market," *Jane's Defense Weekly*, vol. 26, no. 19 (6 November 1996), 30.

²¹ Ezio Bonsignore and Vincent Grimes, "Six for Iris-T, and Iris-T for Six," *Military Technology*, vol. 20, no. 10 (October 1996), 70-72.

²² Dupont, "Europe Competing Strongly in AAMs," *Interavia*, 42.

²³ Bonsignore and Grimes, "Six for Iris-T, and Iris-T for Six," *Military Technology*, 72.

²⁴ Ibid.

²⁵ Ibid., 71-72.

Chapter 3

Arms Transfer and National Security

The things that have made America great are being subverted for the things that make Americans rich.

—Lou Erickson

The US Government has a long history of arms sales to foreign nations. With such a great deal of experience to draw upon, we should be able to formalize some of these lessons into guidance designed to assist us in a business where the consequences of a bad decision can be severe. Using the cases and related discussion presented in the previous chapter, some rules can be formed which will enhance the decision making process and focus on the objectives of US National Security Strategy.

Rules to Live By

The following five rules are presented as a guide, not a single-source decision-making process. The rules are presented in order of importance.

1. Enhance the security of the United States.
2. The gains should outweigh the losses.
3. It's not about money.
4. The supply equals the demand.
5. When all else fails, refer to the first rule (enhance US security).

Enhance the Security of the United States

The first core objective of US National Security Strategy, we need to ensure that our decisions are consistent with what the US government expects from its military forces, which is to enhance the security of the US. In some cases, the benefit is clear, as in the arms sales to the United Kingdom and the EPAF. In other cases, it is obviously in our best interests not to sell the arms. The difficulty lies in assessing the cases involving nations like Iran and Pakistan.

Iran had a close relationship with the US since 1953 when the CIA manipulated a coup that reinstated the Shah. The US, in an effort to reinforce ties in the Middle East, continued to stretch the Iranian people to the breaking point. The close relationship ended with the overthrow of the Shah, which some historians attribute to his overzealous arms deals with the US. Although the political climate was difficult to assess, it should have been obvious at the time that we were selling arms to Iran at a rate far exceeding that of other nations in the Middle East.¹

In the case of Pakistan, we made the correct decision by stopping the sale of F-16s when they violated agreements involving nuclear weapons. More advanced notice of their intent to test nuclear weapons probably could have avoided this sale altogether. Completing this sale, though, would have made the US appear to be supporting the spread of weapons of mass destruction, which contradicts US National Security Strategy.

The Gains Should Outweigh the Losses

It's difficult to put a price on the gains and losses associated with arms sales. If the sale is to be judged as successful, then we should benefit from the transfer. Gains could come from the decreased unit cost, which occurs when larger quantities are sold. The

unit cost of AMRAAMs has gone down since its introduction a decade ago, due in large part to the number of AMRAAMs sold to foreign air forces. As shown in chapter 2, gains could come from the host nation support provided in a region. Saudi Arabia gives us access to their airfields, and we would expect the same from Israel and the UAE if during future Mid East conflicts. Gains could also take the form of increased combat power from coalition building and enhanced force protection. Militarily, it is to our benefit to equip air forces that will fight alongside us in times of crisis. Gains may take the form of a practical advantage in production. Selling missiles to foreign air forces helps in between US missile buys by keeping production lines open.

As seen earlier in this study, losses are sometimes difficult to assess. We always risk compromising US weapons technology, and we need to determine the extent of this risk. This does not imply that it is acceptable for these nations to compromise our technology, however. In *all* cases the country gaining US technology and other sensitive information should be committed to giving it the same degree of security protection that the US gives the same information. Losses could also be monetary. In the case of Israel, we gave them billions in US weapons at the expense of the US taxpayers.

Selling weapons to democratic nations offers many advantages. It provides the benefit of a nation that will use its military might to promote democracy, supporting our third core objective of National Security Strategy. It also poses little risk to US security since history has shown that a stable democracy is unlikely to wage war on another democracy.² Many government officials are opposed to selling weapons to foreign governments simply due to the risks involved. They see our technology as sacred, and allowing another nation to use it, even when supporting US interests, is a risk they are not

willing to take. A clear understanding of the risks and gains associated with a proposed sale is important, and one must give consideration to both. Supporting democracies to some degree is important to US security.

It's Not About Money

This may seem contrary to the second core objective of bolstering our economic prosperity, but the decision goes way beyond monetary gain to US manufacturers. We should never allow ourselves to sell weapons just for the sake of profit, risking damage to US security policies. We allowed South Korea to coproduce F-16s rather than purchase aircraft manufactured in the US. This demonstrates our willingness to overlook relatively minor financial losses when presented with the potential gains of promoting democracy and enhancing US security.

Today, there is a great deal of lobbying from the major aircraft and missile contractors wanting to expand their international sales for the sake of profit. When confronted with this situation, we need to bear in mind the justification behind equipping foreign air forces, which is summarized by the first two rules listed above. If the proposed sale doesn't enhance US security or the gains don't outweigh the losses, then it is probably not a good move.

The Supply Equals the Demand

For a nation wanting to upgrade its military, there will always be another nation willing to sell the desired weapons. All it takes is money. When the US government refuses, the French, Israeli, or even Russian governments are probably waiting to deliver. This complicates the aircraft sales decision process greatly. When a nation decides to buy an aircraft from another nation simply because the package may include Mica or Iris-

T, we should not react by authorizing the sale of AMRAAM or AIM-9X when it is against our policies.

When All Else Fails, Refer to the First Rule (Enhance US Security)

By this point the decision process can get confusing and it's easy to lose sight of the first core objective of National Security Strategy. If it is not possible to determine whether or not the gains outweigh the losses, then the gains may not be as prominent as the potential losses. If the motivation behind a proposed sale is unclear, it may be time for a closer review. If the proposed sale is not to a democratic nation, then it may be motivated by reasons which don't support National Security Strategy. If a particular weapon (like AMRAAM or AIM-9X) is being added to an aircraft package just to ensure we don't lose the deal, it may be time to reconsider.

The underlying principle behind National Security Strategy is enhancing US security. It is important at this point to go back and review the proposed sale to ensure it is consistent with the first core objective. If the proposed sale isn't consistent with the other rules given above, then chances are it doesn't enhance US security either.

Notes

¹ Paul Ferrari, Jeffrey Knopf, and Raul Madrid, *US Arms Exports: Policies and Contractors* (Washington DC: Investor Responsibility Research Center, 1987), 102.

² Bruce Russett, *21st Century Earth: Opposing Viewpoints* (San Diego, CA: Greenhaven Press, Inc., 1996), 209.

Chapter 4

Into the Future

The business of America is not business. Neither is it war. The business of America is justice and securing the blessings of liberty.

—George F. Will
Newsweek

Following our review of the historical data and using the guidelines presented in the preceding section, we are now prepared to discuss some future cases and give rulings on them. Every case is different, and the final decision must be based on the facts surrounding it. The cases to be discussed here are the F-16, Joint Strike Fighter (JSF), F-22, AMRAAM, and the AIM-9X.

F-16

While Lockheed-Martin presses on with the Block 60 for the UAE, other third-world nations may decide to upgrade their air forces. The F-16 will continue to be an attractive option. As the JSF is introduced to the US and Europe, with its enhanced radar, avionics, and stealth capabilities, there will be little reason to restrict sales of the F-16 to qualified US allies. The F-16 Block 60 version will require a little more scrutiny, though, due to its more advanced avionics. This latest version should be restricted to US allies with more stable and long-standing ties with the US. In the Middle East, where the F-16 Block 60 will be introduced to the world, the nations of Bahrain, Kuwait, Oman, and

Saudi Arabia, in addition to the UAE, should be allowed to purchase it. These are the nations the US would rely on to provide stability in the Middle East and help defend against any acts of aggression from Iraq or Iran, enhancing the security of the US. This is an opportunity for the US to provide support to coalition forces. In other parts of the world, nations that already have F-16s in their inventory should be allowed to upgrade to the Block 60, if desired.

The key rules to apply here will be ensuring that *there is more for the US to gain than lose* and then remembering that *it is not about money*. As the Block 60 production presses on, Lockheed-Martin will surely attempt to market their latest version of the F-16 around the world. Cases may arise where this is not in the best interests of the US (similar to the Pakistan sale). A major issue that will challenge US policy makers will be the selection of armament to go with the aircraft sale. This will be complicated by the wide variety of high-tech weapons that are available in the world-wide market.

Joint Strike Fighter

The JSF is being widely promoted by the US and UK as a next-generation multi-role fighter. Its excellent maneuverability, stealth, and relative affordability will make it a popular choice for air forces around the world.¹

As with other key weapons systems, the rules to apply to the JSF will first and foremost be to *enhance US security* and then to ensure that the *gains exceed the losses*. No precedent has been set for exporting stealth aircraft. Stealth technology will give the pilot the ability to operate with a greater degree of freedom in enemy skies. Nations allowed to use stealth technology must be committed to promoting the ideals of democracy. They should also be prepared to support the US as coalition partners in

possible future conflicts. There will be risks associated with the export of stealth technology. Just by owning a stealth aircraft, a country has access to information that will allow them to analyze the design and gain insight into its fundamental characteristics. Stealth technology could be reproduced and sold to other nations. Insight could be gained into how low-observable technology works, which could lead to new radar technology designed to detect stealth aircraft. A country not committed to protecting this information could severely impair the ability of the US military to defend our interests.

Nations allowed to purchase the JSF should have a history of buying and using high-tech weapons made by the US, and they should have repeatedly demonstrated their willingness to protect US strategic technology. Key NATO members should be given first consideration for the JSF.

F-22

The F-22, as it will be intended for the US Air Force, will be in the role of the air superiority mission. Its maneuverability, avionics, and defense capabilities will make it the most capable fighter in the world by far. It will be a replacement for the F-15C, the Air Force's current air superiority fighter. Although the F-22 will have the capability to deliver some precision air-to-ground munitions, it won't have the multi-role appeal found in the F-16 or JSF.² The price of the F-22 will also be much greater than the JSF, making it a less attractive option for many nations.

The same factors go into the decision process for selling the F-22 as were outlined for the JSF. In addition, it's important to remember that *it's not about money*. A great deal of money has been invested in the F-22 program, and its costs are rising above what

was originally promised (in 1997 the development program costs were computed to exceed initial estimates by \$1.86 billion³). As part of their efforts to keep the aircraft cost within limits, Lockheed-Martin-Boeing may try to market the F-22 to various allies. Increasing the number of aircraft produced will drive the unit cost down, and help keep the F-22 program alive and profitable for them. Aircraft unit cost should *not* be a factor when making the decision of whether or not to allow sales of the F-22 to foreign nations. The long-term capabilities of owning F-22s and the risks associated with the marketing of its advanced technology will be the ultimate judgement of this decision. F-22 sales should be limited to our closest allies.

AMRAAM

The AIM-120 AMRAAM is the most sophisticated and capable air-to-air missile in the world. AMRAAMs have already been sold to many US allies. Other nations may make a request to purchase AMRAAMs as they upgrade their defenses. We could inadvertently initiate an arms race by introducing a new capability to a region (such as AMRAAM in South America), and this will require some care. As we review the anticipated proposals to expand our sale of AMRAAMs to the world, it is important to remember that *the supply equals the demand*. If a foreign government really wants to upgrade to the active radar capability found in the AMRAAM, it only needs the money. Chances are that there will be an AMRAAM competitor willing to make the sale. US AMRAAM export orders to date total more than 7000 missiles, which is more than ten times greater than the exports of all competitors missiles combined (including the French MICA and Russian R-77).⁴ This could motivate the competitors to be more aggressive in marketing their missiles, which is something the US will have little control over. It is

important that we don't compromise US policy on AMRAAM sales just to prevent other nations from getting into the market.

The AMRAAM follow-on, the Future Medium-Range Air-to-Air Missile (FMRAAM), will be a significant improvement over the current capability of AMRAAM. The major improvement in FMRAAM will be its "high terminal energy". Using an additional rocket motor, FMRAAM will have an increased range. Additionally, the extra thrust will give it greater speed, which translates to improved end-game maneuvering over current AMRAAMs. These improvements will make the FMRAAM unquestionably the best air-to-air missile in the world. The US can afford to be, and should be, more selective in marketing this missile to foreign governments. *When all else fails, refer to the first rule (enhance US security).*

AIM-9X

The AIM-9X, like the AMRAAM, has similar type missiles being marketed by other nations. As is the case with AMRAAM, *the supply equals the demand*, and denying the sale of AIM-9X to qualified foreign government will most likely result in the loss of a sale to another nation. Policy makers will need to determine the *gain versus loss* to make an informed decision. If we really need these allies to help promote democracy abroad and enhance US security, then it will be worth the risks associated with the sale. If not, then these nations can continue with the older version of AIM-9 or make a bid to another country. Additionally, like AMRAAM, we need to be careful not to inadvertently initiate an arms race in a new region of the world. *When all else fails, refer to the first rule (enhance US security).*

Future Aircraft and Weapons

Many new aircraft and weapons technologies will undoubtedly continue to emerge as we advance the capabilities of our military forces. New systems under design, such as the Unmanned Combat Aerospace Vehicle (UCAV), will emerge, fighting air battles by remote control.⁵ Aircraft electronic reconnaissance systems are under development, which are designed to tap into the information spectrum associated with the increasing usage of data link and other communication systems.⁶ Such systems could allow an enemy to exploit friendly information, giving them an advantage. Each case must be objectively analyzed to determine whether or not it is in our best interests to market it to a foreign government.

Regardless of the weapons system, the guidelines presented earlier will assist in making an informed decision. In all cases, it will be crucial to determine the impact on the security of the US. *When all else fails, refer to the first rule (enhance US security).*

Notes

¹ William B. Scott, "Joint Strike Fighter Balances Combat Prowess, Affordability," *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 51-57.

² Stanley W. Kandebo, "F-22 Will Set Standard for Next-Century Fighter," *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 46-50.

³ Jennifer Palmer, "Air Force May Be Responsible for F-22 Cost Overruns," *Air Force Times* (22 March 1999): 26.

⁴ Steven J. Zaloga, "Missiles Face Murky Future," *Aviation Week and Space Technology*, vol. 148, no. 2 (12 January 1998): 149-152.

⁵ David A. Fulghum, "Aircraft, UCAFs: An Uneasy Mix," *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 68-72.

⁶ Bruce D. Nordwall, "Fighters to Tap the 'Infosphere'," *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 72-74.

Chapter 5

Conclusions

Because we will often act in concert with like-minded nations, as we implement JV 2010, we must also retain interoperability with our allies and potential coalition partners.¹

—National Military Strategy

Multinational operations enhance the capability of the US in obtaining objectives between nations that share common interests. Joint Vision 2010 makes the following statement in support of multinational operations:

It is not enough just to be joint when conducting future operations. We must find the most effective methods for integrating and improving interoperability with allied and coalition partners. Although our Armed Forces will maintain decisive unilateral strength, we expect to work in concert with allied and coalition forces in nearly all of our future operations, and increasingly, our procedures, programs, and planning must recognize this reality.²

In preparing for future conflict, we must build forces strong enough to defend our interests. In many regions we share common interests with other nations, and these common interests form the basis for multinational forces. There are many government officials who are opposed to selling US high-tech weapons, though. They see it as an erosion of the US edge in the combat arena, and believe some of these “friendly” nations will actually turn on us in future conflicts. As long as we select our coalition partners carefully, giving our support to nations sharing common interests with us, we will

continue to enhance our security. Interoperability is crucial, and equipping the air forces of our coalition partners greatly enhances interoperability.

Using the core objectives of US National Security Strategy as a guide, several cases involving the transfer of US arms to foreign air forces were reviewed. These cases presented examples of good decisions, as with the sale of F-16s to South Korea, as well as cases of not so good decisions, as in the sale of fighter aircraft and weapons to Iran. Drawing on these experiences, some simple rules were made to help guide the process. While not a substitute for experience and common sense, these guidelines help focus on the key factors which must never be overlooked.

Given the nature of US military weapons and the fact that they were designed and built within the US for the purpose of protecting the interests of the US, we need to ensure that this is what our military weapons are used for. Anything that benefits individuals, corporations, or tyrants, at the expense of promoting freedom, human rights, or national security, is wrong. The core values presented in *A National Security Strategy for a New Century* are an excellent reference. While making decisions regarding the possible sale of weapons to foreign governments, one should never lose sight of these core values.

Notes

¹ *National Military Strategy of the United States of America* (Joint Chiefs of Staff, 1997), 17.

² *Joint Vision 2010, America's Military: Preparing for Tomorrow* (Joint Chiefs of Staff), 9.

Glossary

| | |
|--------|--|
| ACDA | Arms Control and Disarmament Agency |
| AIM | Air Intercept Missile |
| AMRAAM | Advanced Medium-Range Air-to-Air Missile (AIM-120) |
| ASRAAM | Advanced Short-Range Air-to-Air Missile |
| BVR | Beyond Visual Range |
| DCS | Direct Commercial Sales |
| EPAF | European Air Forces (Belgium, Denmark, The Netherlands, and Norway) |
| FMRAAM | Future Medium-Range Air-to-Air Missile |
| FMS | Foreign Military Sales |
| GCC | Gulf Cooperation Council (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE) |
| HARM | High-Speed Anti-Radiation Missile |
| JSF | Joint Strike Fighter |
| NATO | North Atlantic Treaty Organization |
| ROKAF | Republic of Korean Air Force |
| UAE | United Arab Emirates |
| UCAF | Unmanned Combat Aerospace Vehicle |

Bibliography

- A National Security Strategy for a New Century*. October 1998.
- Apple, Lt. Col. Nick P. and Gurney, Lt. Col. Gene. *The Air Force Museum*. New York: Crown Publishers, Inc., 1980.
- Bonsignore, Ezio and Grimes, Vincent. "Six for Iris-T, and Iris-T for Six." *Military Technology*, vol. 20, no. 10 (October 1996): 70-72.
- Brzoska, Michael and Ohlson, Thomas. *Arms Transfers to the Third World 1971-1985*. New York: Oxford University Press, 1987.
- Cook, Nick. "Russian Missiles Hot up Western Market." *Jane's Defense Weekly*, vol. 26, no. 19 (6 November 1996): 27-30.
- Dorfer, Ingemar. *Arms Deal: The Selling of the F-16*. New York: Praeger Publishers, 1983.
- Dupont, Jean. "Europe Competing Strongly in AAMs." *Interavia*, vol. 53, no. 616 (January 1998): 42-44.
- The Encyclopedia of Air Warfare*. New York: Thomas Y. Crowell Company, 1975.
- Ferrari, Paul, Knopf, Jeffrey, and Madrid, Raul. *US Arms Exports: Policies and Contractors*. Washington DC: Investor Responsibility Research Center, 1987.
- Fulghum, David A. "Aircraft, UCAFs: An Uneasy Mix." *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 68-72.
- Isby, David C. "The Emirs' New Swords." *Military Technology*, vol. 19, no. 3 (March 1995): 10-16.
- Joint Vision 2010, America's Military: Preparing for Tomorrow*.
- Kandebo, Stanley W. "F-22 Will Set Standard for Next-Century Fighter." *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 46-50.
- Kozyrev, Andrei. *The Arms Trade: A New Level of Danger*. Moscow, USSR: Progress Publishers, 1985.
- Lockheed-Martin. *The Fighting Falcon F-16 – The Choice of Twenty Air Forces*, 1999, n.p. On-line. Internet, 28 January 1999. Available from <http://www.lmtas.com/f16/f16choic.html>.
- National Military Strategy of the United States of America*. 1997.
- Nordwall, Bruce D. "Fighters to Tap the 'Infosphere'." *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 72-74.
- Palmer, Jennifer. "Air Force May Be Responsible for F-22 Cost Overruns." *Air Force Times* (22 March 1999): 26.
- Proctor, Paul. "Basic Defense Work Still on Track in Asia." *Aviation Week and Space Technology*, vol. 148, no. 8 (23 February 1998): 66-67.
- The Rand McNally Encyclopedia of Military Aircraft, 1914-1980*. The Military Press, 1983.

- Russett, Bruce. *21st Century Earth: Opposing Viewpoints*. San Diego, CA: Greenhaven Press, Inc., 1996.
- Scott, William B. "Joint Strike Fighter Balances Combat Prowess, Affordability." *Aviation Week and Space Technology*, vol. 149, no. 5 (3 August 1998): 51-57.
- Song, Byung-Nak. *The Rise of the Korean Economy*. Hong Kong: Oxford University Press, 1994.
- US Arms Control and Disarmament Agency. *Country Rankings: 1996, 1997*, n.p. On-line. Internet, 5 February 1999. Available from <http://www.acda.gov/wmeat95/wmeatlst.htm>.
- US Department of State. *Country Commercial Guides: Pakistan*, 1999, n.p. On-line. Internet, 5 February 1999. Available from http://www.state.gov/www/about_state/business/com_guides/1999/sa/pakistan99.html.
- US Information Agency. *US, Pakistan Reach Agreement on F-16 Aircraft*, 1999, n.p. On-line. Internet, 5 February 1999. Available from <http://www.usia.gov/regional/nea/sasia/docs/doc96.html>.
- Zaloga, Steven J. "Missiles Face Murky Future." *Aviation Week and Space Technology*, vol. 148, no. 2 (12 January 1998): 149-152.

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